AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A protective relay system for power line thermal protection using programmable logic present within the relay with the capability of constructing associated logic equations, comprising:

a protective relay for power lines, which includes a programmable logic capability by which the end user of the protective relay can enter settings which are then used by the relay in carrying out its thermal protection functions;

a set of stored thermal model equations which when solved emulate the temperature of a power line conductor, based on a plurality of individual setting values which are enterable into the relay by the end user, the plurality of individual setting values including at least one user alterable temperature setting, and wherein the logic and logic equations implement the entered setting values into the thermal model equations which produce an emulated temperature of the conductor; and

means for providing an indication when the temperature of the conductor exceeds a preselected value.

2. (Original) The system of claim 1, wherein the settings entered by the end user include solar model settings directed toward heating of the conductor affected by solar considerations, thermal model settings which are determined from physical aspects of the conductor and temperature settings.

3. (Original) The system of claim 2, wherein the solar model settings include a default solar heating value, a solar absorption coefficient, the conductor diameter, the longitude of time standard, the longitude of the conductor and the latitude of the conductor, wherein the thermal model settings for the conductor include its AC resistance at 25°C, the temperature coefficient of the AC resistance, the thermal heating capacity and the thermal resistance of the ambient temperature, and wherein the temperature settings include the estimated ambient temperature, the estimated offset temperature, the high temperature threshold, the low temperature threshold and the conductor initial temperature.

4. (Original) The system of claim 1, including a first comparator which compares the temperature from the logic output with a first temperature threshold, and wherein if the temperature at the logic output

exceeds the first threshold, an alarm is provided, and including further a second comparator which compares the temperature at the logic output with a second threshold, wherein if the second threshold is exceeded, a trip signal for a circuit breaker is provided.

5. (Original) The system of claim 1, wherein the conductor temperature is expressed as a first order differential equation in accordance with $P - L = THC\frac{dTC}{dT}$, where P is equal to the heat power supplied to the conductor, L is the conductor heat losses, THC is the conductor heat thermal capacity and TC is the estimated conductor temperature.

6. (Original) The system of claim 5, wherein the heat power supplied to the conductor $= (\underline{I}^2 \bullet (rac) + (TC - 25) \bullet rdelt) + Q_{sun}$, where I is equal to the conductor current, rac is equal to the AC conductor resistance at 25°C, and rdelt is equal to the temperature coefficient of the AC resistance, Qsun is equal to the heat power input from the sun, and wherein the conductor heat losses are $Q_{radiated}$ + $Q_{convected}$, the radiated heat losses and the convection heat losses.

7. (Original) The system of claim 1, wherein the relay is a distance relay.

8. (Currently Amended) A method of providing thermal protection to a monitored conductor, the method operating within a protective relay which accepts settings entered by a user, the accepted settings including at least one user alterable temperature setting, the method comprising the steps of:

using said settings within a set of equations which emulate the temperature of the monitored conductor; and

indicating when the temperature of the monitored conductor exceeds a preselected value.

9. (Currently Amended) A protective relay system for power line thermal protection using programmable logic present within the relay with the capability of constructing associated logic equations, comprising:

a protective relay for power lines, which includes a programmable logic capability by which the end user of the protective relay can enter settings which are then used by the relay in carrying out its thermal protection functions; and

a set of stored thermal model equations which when solved emulate the temperature of a power line conductor, based on a plurality of individual setting values which are enterable into the relay by

the end user, the individual setting values including at least one user alterable temperature setting, and wherein the logic and logic equations implement the entered setting values into the thermal model equations which produce an emulated temperature of the conductor.

10. (New) A protective relay system for power line thermal protection using programmable logic present within the relay with the capability of constructing associated logic equations, comprising:

a protective relay for power lines, which includes a programmable logic capability by which the end user of the protective relay can enter settings which are then used by the relay in carrying out its thermal protection functions;

a set of stored thermal model equations which when solved emulate the temperature of a power line conductor, based on a plurality of individual setting values which are enterable into the relay by the end user, the plurality of individual settings including solar model settings directed toward heating of the conductor affected by solar considerations, thermal model settings which are determined from physical aspects of the conductor and temperature settings, and wherein the solar model settings include a default solar heating value, a solar absorption coefficient, the conductor diameter, the longitude of time standard, the longitude of the conductor and the latitude of the conductor, wherein the thermal model settings for the conductor include its AC resistance at 25°C, the temperature coefficient of the AC resistance, the thermal heating capacity and the thermal resistance of the ambient temperature, and wherein the temperature settings include the estimated ambient temperature, the estimated offset temperature, the high temperature threshold, the low temperature threshold and the conductor initial temperature, and wherein the logic and logic equations implement the entered setting values into the thermal model equations which produce an emulated temperature of the conductor; and

means for providing an indication when the temperature of the conductor exceeds a preselected value.

11. (New) A protective relay system for power line thermal protection using programmable logic present within the relay with the capability of constructing associated logic equations, comprising:

a protective relay for power lines, which includes a programmable logic capability by which the end user of the protective relay can enter settings which are then used by the relay in carrying out its thermal protection functions;

a set of stored thermal model equations which when solved emulate the temperature of a power line conductor, based on a plurality of individual setting values which are enterable into the relay by the end user, and wherein the logic and logic equations implement the entered setting values into the thermal model equations which produce an emulated temperature of the conductor, and wherein the conductor temperature is expressed as a first order differential equation in accordance with $P - L = THC\frac{dTC}{dT}$, where P is equal to the heat power supplied to the conductor, L is the conductor heat losses, THC is the conductor heat thermal capacity and TC is the estimated conductor temperature, and wherein the heat power supplied to the conductor $= (\underset{\sim}{I}^2 \bullet (rac) + (TC - 25) \bullet rdelt) + Q_{sun}$, where I is equal to the conductor current, rac is equal to the AC conductor resistance at 25°C, and rdelt is equal to the temperature coefficient of the AC resistance, Qsun is equal to the heat power input from the sun, and wherein the conductor heat losses are $Q_{radiated} + Q_{convected}$, the radiated heat losses and the convection heat losses; and

means for providing an indication when the temperature of the conductor exceeds a preselected value.